
Processes, as a Subject of Invention

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The statutory provision making processes one of the subjects of patent protection is not as definite or clear as that relating to machines, composition of matter, and articles of manufacture. The word "art" was used in the statute, and its meaning, or rather its exact scope in this relation, has caused much doubt and confusion of court decisions during the history of patent litigation. Even as late as 1895, we find in the Supreme Court decision *Risdon Iron and Locomotive Works vs. Medart et al.*, 158 U. S., 68; 71 O. G., 751, ground for doubt on one phase of the question, that is, the question of the patentability of purely mechanical processes.

Also in former times, there was much doubt as to where to draw the limit in another direction, that is, between a proper process and a monopoly of the use, even for a particular purpose, of any one of the principles of nature, and likewise, between a proper process and a statement of general notion or idea of some result to be accomplished but without specific way or steps of doing it, claims for which are sometimes called functional.

Patentably, a process has been defined by the Supreme Court as a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing (*Cochrane vs. Deener*, 11 O. G., 687, 94 U. S., 780), and—a process is an act or mode of acting (*Tilgman vs. Procter*, 102 U. S., 707).

The second part of the first definition and the second one as a whole especially set forth the vital elements

of a proper process, as being one or more acts, commonly called steps, which are performed. These steps are the actual positive things to be done by the operator in executing the process. They do not necessarily, and, in fact, in chemical processes seldom, if ever, represent all the numerous or secondary actions or reactions that take place as a result of the actual or primary steps performed. For instance, a claim for preparing a bleaching liquor might include only the single positive step of passing an electric current through an aqueous solution of sodium chloride. It would be entirely proper as a process claim though some half dozen chemical reactions would take place in the solution while the current passed. In chemical processes, it would be entirely impracticable to name as steps all that happens in the process as secondary actions.

In chemical processes the materials treated may be considered to enter into or patentably modify the steps. The process consisting of heating to $2,000^{\circ}\text{C}$. a mixture of calcium oxide and carbon would be a different process from that of heating to $2,000^{\circ}\text{C}$. a mixture of silica and carbon; in one case, the result would be calcium carbide and in the other silicon carbide, two different products. And likewise, the step of mixing nitric acid and glycerine would constitute a very different process from that of mixing nitric acid and sodium hydroxide. These would constitute patentably different processes because a different chemical reaction results in each of the two cases which produce products widely different in their properties. This, however, is not considered to be true in the case of broadly mixing or otherwise treating inert materials. Thus, the step broadly of mixing gravel and tar to make a paving compound, while perhaps a proper process, is not patentably different from that of mixing granulated coal and tar to make fuel briquettes. Any patentability in the case of these latter examples would reside in the mixture and not in the mixing. This does not mean that in case some special result is derived from a particular way of mixing two or more ingredients even in non-chemical cases, there might not be patentability in the process.

On account of the indefinite scope of the word "art"

in the statute, it has remained for the federal courts, the tribunals of the Patent Office, and text writers to lay out such bounds as we have for this subject of invention.

One question though it now seems elementary and only of historical interest, caused much controversy in the early history of patent litigation; viz., should a person when he had discovered that a natural fact or principle of nature was capable of use for some purpose be entitled to claim the exclusive use of that agency for that purpose, or should he be limited to some specific way or mode of applying it; that is, to some steps to be performed by which the fact or principle was utilized and embodied in a working process or by constructing a machine depending upon the fact. It was finally decided that neither the facts themselves, nor the use thereof, were subjects of patents, since to allow such patents would obstruct instead of promote the advance of the different arts, many of which depend upon these very principles of nature for their existence.

The terms "elemental force," "scientific fact," "principle of nature," and even "principle" have all been used synonymously in this relation to designate these various facts or principles of nature. Careful distinction must be made, however, where the term "principle" is used not to confuse it with its use in a more general sense in patent law, that is, where it is used to refer to the plan according to which a process or machine operates, a mode of action, otherwise denoted the principle of the process or machine. In this sense it might include any number of primary or elementary facts. Whichever of these terms, and perhaps of other similar ones, is used in this relation, that is, as being something different from a patentable process, it means any of the facts relative to the properties of matter or actions of the various forces of nature, including in its scope all of the manifestations by results of the various physical and chemical forces such as mere mechanical energy, heat, light, electricity, magnetism, chemical affinity, gravity, and the energy involved in the various forms of cathode, radium, and similar rays or emanations.

The subjects of physics and chemistry and combinations of the two are made up of, and have for an object,

the classification of the many directly apparent properties of matter and characteristics of the above-named forces in order that theories and laws may be formulated leading to others not so apparent. All these facts relating to actions and reactions in the material world around us, are available as foundations for processes, but in themselves they are not subjects of patents. They are as building stones or structural units with which inventors may construct the purely artificial creations designated processes.

A process, then, may be said to be something artificial, while a principle or scientific fact is a thing of nature. For devising the former, a person may be given a patent; for discovering the latter, he may be given a doctor's degree or other reward, but there can be no patent for a mere principle or scientific fact.

The inventor may or may not be the discoverer of the chemical or physical facts or laws which he utilizes in devising his process. If the particular step or combination of steps which he employs in applying and utilizing the one or more facts be new, that is sufficient.

It would seem that the word "art" might be broad enough in scope to permit the granting of a patent for the exclusive use of one of these principles of nature for a particular purpose, that is, for the creation of a new art to the first discoverer thereof, as, for instance, the exclusive use of the electric current for writing intelligible characters at a distance, or transmitting sound or generating light, or for the exclusive use of high frequency electromagnetic waves for conveying intelligence, as in the wireless telegraph art, or for the exclusive use of the fact that hydrogen is lighter than air for the purpose of aerial navigation. These could properly be called new arts. This view was expressed in a very logical dissenting opinion in *O'Riley vs. Morse*. It was decided in that case, however, that the term art in the statute could not be allowed such broad scope, the court placing the reason therefor on the above-mentioned ground that to do so and thus close such large fields to invention would hinder rather than promote the advancement of the useful arts.

In the case of *O'Riley vs. Morse*, 15 How., 62, the Supreme Court announced the rule that the exclusive use of a principle of nature or scientific fact for a particular

purpose broadly was not a proper subject of a patent, that the most that could be recognized by the patent laws was some specific process or apparatus embodying or depending upon the fact.

This case involved the patent to Morse on the electric telegraph. In connection with the question, it is of interest to note that the mechanism of the original telegraph was very complicated compared to one of today for merely sending a single message at a time. It was not recognized at that time that messages might be sent by the now familiar hand key and received by ear alone, although transmission of mere signals was known; and, therefore, Morse devised an automatic machine employing devices similar to type which had to be set up in a holder adapted to be moved past a contact for making and breaking the current according to requirements of spelling out the words of the message and likewise an automatic machine for moving a tape past a marker worked by an electromagnet at the receiving end.

One of Morse's claims was considered of such scope as to be for the use of an electric current for marking intelligible signs at any distance. It is claim 8 of Reissue No. 117, June 13, 1848, worded as follows:

"Eight, I do not propose to limit myself to the specific machinery or parts of machinery described in the foregoing specification and claims; the essence of my invention being the use of the motive power of the electric or galvanic current, which I call "electro-magnetism" however developed for marking or printing intelligible characters, signs, or letters at any distances, being a new application of that power, of which I claim to be the first inventor or discoverer."

The court said as to this claim:

"It is impossible to understand the extent of this claim. He claims the exclusive right to every improvement where the motive power is the electric or galvanic current, and the result is the marking or printing intelligible characters, signs, or letters at a distance."

"If this claim can be maintained, it matters not by what process or machinery the result is accomplished. For aught that we now know, some future inventor, in the onward march of science, may discover a mode of writing or printing at a distance by means of the electric and galvanic current, without using any part of the process or combination set forth in the plaintiff's specification. His invention may be less complicated—less liable to get out of order—less expensive in construction and in its operation. But yet, if it is covered by this patent, the inventor could not use it, nor the public have the benefit of it without the permission of this patentee."

"Nor is this all: while he shuts the door against inventions of other persons, the patentee would be able to avail himself of new discoveries in the properties and powers of electro-magnetism which scientific men might bring to light. For he says he does not confine his claims to the machinery or parts of machinery which he specifies, but claims for himself a monopoly in its use however developed for the purpose of printing at a distance. New discoveries in physical science may enable him to combine with it new agents and new elements, and in that manner attain the object in a manner superior to the present process, and altogether different from it. If he can secure the exclusive use by his present patent, he may vary it with every new discovery and development of the science, and need place no description of the new manner, process, or machinery upon the records of the Patent Office. And when his patent expires, the public must apply to him to learn what it is. In fine, he claims a manner and process which he has not described, and indeed had not invented, and, therefore, could not describe when he obtained his patent. The court is of opinion that the claim is too broad and not warranted by law."

"No one, we suppose, will maintain that Fulton could have taken out a patent for his invention of

propelling vessels by steam, describing the process and machinery he used, and claimed under it the exclusive right to the use of the motive power of steam, however developed, for the purpose of propelling vessels. It can hardly be supposed that under such a patent he could have prevented the use of the improved machinery which science has since introduced, although the motive power is steam and the result is the propulsion of vessels."

"Neither could the man who first discovered that steam might, by a proper arrangement of machinery, be used as a motive power to grind corn or spin cotton, claim the right to the exclusive use of steam as a motive power for the purpose of producing such effects."

"Again, the use of steam as a motive power in printing presses is comparatively a modern discovery. Was the first inventor of a machine or process of this kind entitled to a patent, giving him the exclusive right to use steam as a motive power, however developed, for the purpose of making or printing intelligible characters? Could he have prevented the use of any other press subsequently invented where steam was used? Yet, so far as patentable rights are concerned, both improvements must stand on the same principles. Both use a known motive power to print intelligible marks or letters; and it can make no difference in their legal rights under the patent laws, whether the printing is done near at hand or at a distance. Both depend for success, not merely upon the motive power, but upon the machinery with which it is combined. And it has never, we believe, been supposed by any one that the first inventor of a steam printing press was entitled to the exclusive use of steam as a motive power, however developed, for marking or printing intelligible characters."

"Indeed, the acts of the patentee himself are inconsistent with the claim in his behalf for in 1846 he took out a patent for his new improvement of local circuits by means of which intelli-

gence could be printed at intermediate places along the main line of the telegraph and he obtained a reissued patent for this invention in 1848. Yet in this new invention the electric or galvanic current was the motive power and writing at a distance the effect. The power was undoubtedly developed by new machinery and new combinations. But if his eighth claim could be sustained, this improvement would be embraced in his first patent. And if it was so embraced, his patent for the local circuits would be illegal and void; for he could not take out a subsequent patent for a portion of his first invention, and thereby extend his monopoly beyond the period limited by law."

Attorneys for Morse had cited several cases alleged to support their contention that a claim of this scope should be sustained. Among these cases was a British case, *Neilson et al. vs. Harford et al.*, decided by the English Court of Exchequer. Neilson was the inventor of the process of supplying hot air blast to furnaces where before cold air had been used. He accomplished this by interposing between the blowing device and the furnace a receptacle or passageway through which the air passed on its way to the furnace and which could be heated by heat applied externally to the walls. This was found to be a very valuable way of operating furnaces of various sorts because the hot air resulted in the production of a much higher temperature in the furnace and reduced the ore much faster.

The Court of Exchequer had said that it had had much doubt whether the Neilson patent was not for the principle that heated air would produce better combustion than cold and intimating that, if so, the patent would be void, but stated that after much consideration it had concluded that it was not for a principle but for an apparatus embodying a principle. They said:

"After full consideration, we think that the plaintiff does not merely claim a principle, but a machine embodying a principle and a very valuable one. We think the case must be con-

sidered as if the principle being well known, the plaintiff had first invented a mode of applying it by a mechanical apparatus to furnaces and his invention then consists in this by interposing a receptacle for heated air between the blowing apparatus and the furnace. In this receptacle he directs the air to be heated by the application of heat externally to the receptacle; and thus he accomplishes the object of applying the blast which was before cold air in a heated state to the furnace."

The Supreme Court said as to this citation that instead of supporting the contention that a principle might be claimed, it rather denied it, since the Court of Exchequer specifically said that Neilson's invention would be considered not for a principle but for a machine embodying a principle; a mode of applying a known principle to furnaces by interposing a receptacle for heating air between the blowing apparatus and the furnace and further making it clear that if the patent had been construed as one for the exclusive use of a principle or fundamental law of nature, that is, the exclusive use of the fact that hot air resulted in higher temperatures than cold air, that the patent would not have been sustained. The court, therefore, denied that this citation in any way afforded any ground for sustaining such style of claim, citing with approval the case of *Le Roy et al. vs. Tatham*, 14 Howard, 156.

This case of *Le Roy et al. vs. Tatham* had been decided by the Supreme Court the year previous, that is, 1852, and is interesting, not so much on account of any direct decision by the court on the question of claiming a newly discovered natural phenomenon or principle, but on account of the variation of opinion and discussion of the question, both as between the lower court, which, in this case, was the Circuit Court of the Southern District of New York, and the Supreme Court, and between the members of the Supreme Court itself, since three of the members dissented.

The facts involved in this case were that John and Charles Hanson, the inventors and assignors to Tatham, had discovered an unknown property of certain soft metals, such as lead, that if a solidified or unmolten body of it be divided under non-oxidizing conditions and at certain temperature, and the parts be pressed together, they will reunite or weld perfectly to form an integral piece. This property of the metal was very useful in making lead pipe, since all that was necessary was a cylinder with a plunger at one end, and an opening with a mandrel or core, centered therein at the other. The core, however, had to be supported rigidly enough to avoid being moved out of center with respect to the opening. It was, therefore, supported by a bridge piece extending across the inner end of the die or outlet opening and this required that the lead in being extruded should divide to pass around the obstructing bridge member, and reunite to form the annular wall of the tube. This was where the newly discovered property of the lead came into use, since before that time the mandrel or core had as was thought necessary been supported from the plunger at the other end of the cylinder, or even beyond the plunger and extended through a hole in the plunger and thence on through the die opening, thereby not being rigid or stable enough laterally in the die to make uniform or concentrically walled tubing. The invention was of great practical value; the extruded lead being in better physical state than cast lead and the mandrel, being very rigidly and accurately held directly in the die by the bridge piece, made the pipe of mechanically perfect dimensions and uniformity. But it all depended upon the newly found principle or physical fact that solid lead would thus flow around a bridge piece, and again unite into a homogeneous mass to form a tube. This being true, we have a peculiar set of circumstances, for the same style of machine had been used before and in the same way for forming macaroni and in making clay pipe, and the claim was worded in a peculiar way as:

"We do not claim as our invention and improvement any of the parts of the above described machinery, independently of its arrangement and

combination above set forth. What we do claim as our invention, and desire to secure, is the combination of the following parts above described, to wit, the core and bridge, or guide die, when used to form pipes of metal, under heat and pressure in the manner set forth, or in any other manner substantially the same."

The judge in the Circuit Court had instructed the jury in respect to patentability over the publications cited, showing the application of like machines in other arts, that:

"The result is a new manufacture, and even if the mere combination of machinery in the abstract is not new, still, if used and applied in connection with the practical development of a principle newly discovered, producing a new and useful result, the subject is patentable. In this view, the improvement of the plaintiff is the application of a combination of machinery to a new end—to the development and application of a new principle, resulting in a new and useful manufacture. That the discovery of a new principle is not patentable but it must be embodied and brought into operation by machinery, so as to produce a new and useful result. Upon this view of the patent it is an important question for the jury to determine, from the evidence, whether the fact is established, on which the alleged improvement is founded, that lead in a set or semi-solid state can thus be reunited or welded, after separation," and further—

"That in the view taken by the court in the construction of the patent, it was not material whether the mere combinations of machinery referred to were similar to the combinations used by the Hansons, because the originality did not consist of the novelty of the machinery, but in bringing a newly discovered principle into practical application, by which a useful article of manufacture is produced, and wrought pipe made as distinguished from cast pipe."

A verdict and judgment sustaining the claim was rendered.

It, therefore, appears that the lower court based the validity of this claim entirely on the newly found principle of nature, the physical fact that solid lead would thus divide and homogeneously unite under pressure, and the wording of the instructions seems very similar to the expression of opinion in the English case, *Neilson et al. vs. Harford et al.*, above referred to, and another on the same patent, *Househill Company vs. Neilson*. But we have the distinction between this case and the English cases that English patents do not to such extent depend on the exact construction of the claims, and, second, that the apparatus described in Neilson's patent was not old, as in the present case. The English court could, therefore, say in considering Neilson's patent that it was not for a principle, but for apparatus or process embodying a principle, and, therefore, as the apparatus and corresponding operation or function were novel, the patent was held valid. But no such latitude is allowable in American practice. Therefore when the present case was appealed to the Supreme Court on the ground that the above quoted instructions to the jury were erroneous, a majority of the court held that in view of the form of the claim, as being for the combination of the several mechanical elements when used to produce lead pipe, that the novelty of the machine alone was material to patentability, and that the principle of nature or physical fact involved in the behavior of lead could not be held to affect the question, that it was merely a case of double use. The court stated, however, in discussing the erroneous idea of the Circuit Court, that there was much confusion both in court decisions and in the text books about the distinctions between principles and processes, and as to patentability of the exclusive use of the latter. But the court stated positively that principles, fundamental truths, or facts of nature were not included in the scope of the term art of the patent statutes, and this would apply either to the appropriation for exclusive use and for a particular purpose of a known fact or principle or to the exclusive use in general of a newly found or discovered fact or principle. Mere discovery

of a natural fact or scientific truth which necessarily existed before as well as after being found, is not invention, but any step or steps directed to the application of one or more of these facts or principles is a subject of invention.

In *Tilgman vs. Proctor*, U. S. Reports, 102, page 707, 1880, we have another Supreme Court decision which discusses the subject of processes patentably considered.

Tilgman, on October 3, 1854, secured a patent, No. 11,766, for a process of separating vegetable or animal fats into their components, glycerine and fatty acid, by subjecting an emulsion of the fat in water to a temperature between 440° F. to 660° F., depending upon the particular fat treated and speed of reaction desired, under a pressure of 2,000 pounds per square inch. This resulted in a reaction of water with the fat to split it into glycerine and fatty acid, which separated when allowed to stand and cool into two layers which could be drawn off separately.

The single claim was worded as follows:

"The manufacture of fat acid and glycerine from fatty bodies by the action of water at a high temperature and pressure."

This claim does not clearly set forth any positive steps performed, but merely refers to the action of water at high temperature and pressure.

The court construed it to mean subjecting to a high degree of heat, a mixture of fat and water, which construction involves the substitution of the words *subjecting to* for the expression *by the action of*, thereby making the claim more positive in terms of steps. After thus construing it, the court held that it was not for a principle or chemical fact—the fact that water at high temperature and pressure would decompose fat—but for a proper process. It said:

"In the first place, the claim of the patent is not for a mere principle. The chemical principle, or scientific fact upon which it is founded is, that the elements of neutral fat require to be severally united with an atomic equivalent of water in order to separate from each other and become free."

Thus indicating that if the claim had been considered to be for a mere chemical fact, it would not have been valid.

The third important case along this line is the decision of the Supreme Court in the so-called Telephone Cases, 126 U. S., 1. The court rendered a single decision on five appeals from five separate circuit court cases, involving the two patents to Alexander Graham Bell, No. 174,465, March 7, 1876, and No. 186,787, January 30, 1877. One of these patents was based on the principle that if an iron diaphragm is vibrated in the neighborhood of an electro-magnet through which a current is flowing, undulations will be set up in the electric circuit which correspond exactly to the vibrations of the air which accompany vocal or other sounds. This patent also disclosed other ways of producing the undulating current, one of which consisted of a wire dipping into a bath of mercury to a greater or less extent according to the sound waves, which varied the resistance of the circuit to a current flowing through the wire and bath. The other patent involved the same general idea except in place of an electro-magnet, a permanent magnet surrounded by a coil was used and an undulatory current was generated by the magneto effect of the vibrating diaphragm in the neighborhood of the coil and permanent magnet. Any one of these species of device could be used as the transmitter or sending instrument and either the first or third forms of instrument was used at the receiving end of the line where the undulatory current flowing through the coil vibrated the diaphragm to create corresponding sound waves.

The important question in this case was the scope of claim 5 of Patent No. 174,465, worded as follows:

"The method of, and apparatus for, transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."

This claim is of very queer form according to our present practice. It seems intended to cover both process

and apparatus by the expression "method of and apparatus for" and it is very indefinite or incomplete as to what steps are included when considered as a process. It merely states, in substance, the method of transmitting sound by causing electrical undulations similar in form to the vibrations of the air accompanying the sound. The only step set forth is—causing electrical undulations, which obviously would not by itself transmit sound; perhaps the words "as herein described" used in the claim, were considered sufficient to involve other necessary steps. However, the court held that this was a valid claim to cover each of the above species of processes, and accompanying device. The court said:

"In this art—or what is the same thing under the patent law, this process, this way of transmitting speech—electricity, one of the forces of nature, is employed; but electricity left to itself will not do what is wanted. The art consists in so controlling the force as to make it accomplish the purpose."

"It had long been believed that if the vibrations of air caused by the voice in speaking could be reproduced at a distance by means of electricity the speech itself would be reproduced and understood. How to do it was the question. Bell discovered that it could be done by gradually changing the intensity of a continuous electric current so as to make it correspond exactly to the changes in the density of the air caused by the sound of the voice. This was his art. He then devised a way in which these changes of intensity could be made and speech actually transmitted. Thus his art was put in condition for practical use."

It seems, therefore, that the court did not regard Bell's patent as being for a mere principle, but for a process, although the claim is of rather vague form.

Even considering the indefinite form of claim in each of the three patents of Morse, Tilgman and Bell, there seems to be a difference in the intent or fundamental

idea between the claim of Morse and those of Tilgman and Bell.

Morse's claim is, in effect—

“ . . . the essence of my invention being the use of the motive power of the electric or galvanic current which I call electromagnetism however developed, for marking or printing intelligible characters, signs, or letters at any distances.”

Tilgman claimed, in effect—

“ . . . decomposing fats by the action of water at a high temperature and pressure.”

While Bell claimed in effect as to the process:

“The method of transmitting sound as herein described by causing electrical undulations, similar in form to the vibrations of the air accompanying the said sound.”

There is less difference between Morse's and Tilgman's claim than between Bell's and the other two. Bell's claim seems merely to be open to the fault of being for an incomplete process for transmitting sound. The only positive step included in his claim is, causing electrical undulations corresponding to sound waves, whereas a second important step would be necessary, that of causing sound waves corresponding to the electrical undulations produced. The claim could not be held to be for the exclusive use of any scientific fact or principle as such. It is not so stated. It is stated in the form of a step or act to be performed, while Morse's claim, on the other hand, is of different form, as boldly for the use of electromagnetism for marking characters at a distance. This is not stated in the form of some specific step or way of using the force or principle of nature, but for any or all ways of using it for that purpose; that is, for the exclusive use of a principle of nature.

Tilgman's claim, if transposed so as to be stated in the same order, would read, “I claim the action of water at high temperature and pressure for decomposing fats.”

This brings the difference down to the mere difference

between Morse's expression, "the use of electromagnetism," and Tilgman's, "by the action of water at high temperature and pressure." The court, however, construed Tilgman's claim to mean, subjecting fat to the action of water at high temperature and pressure, which clearly makes a process out of it, and removes any doubt that one of the chemical facts of nature is being claimed; that is, the fact that hot water under pressure decomposes fats.

MECHANICAL PROCESSES.

Another question that has involved much controversy is whether processes may consist entirely of mechanical steps and actions as distinguished from involving some chemical reaction.

A series of cases along this line are *Corning vs. Burden*, 15 How., 267, 1853; *Risdon vs. Medart*, 1895, C. D., 330; *Westinghouse vs. Boyden*, 170 U. S., 537, and *Expanded Metal Co. vs. Bradford*, 214 U. S., 366.

The case of *Corning vs. Burden*, 15 How., 267, 1853, involved an alleged method of preparing puddler's balls for rolling according to patent to Burden, 1,890, Dec. 10, 1840. Two species of the machine were illustrated and described in the patent; one was formed of a revolvable drum and a stationary member extending about half way around the drum spaced somewhat eccentrically therefrom to give a gradually narrowing space between the drum and member from one end of the member to the other, so that when a puddler's ball was placed at the wider or mouth end of the space, it would be seized by the rotation of the cylinder and rolled between itself and the member to the narrow end of the space and be discharged as a consolidated and kneaded cylinder ready for the subsequent rolling operation. Another species involving a reciprocating wedge-shaped piece working adjacent a stationary surface accomplished the same result. The claim was worded as follows:

Having thus fully made known the nature of my said improvements, and explained and exemplified the manner in which I construct the

machinery for carrying the same into operation, what I claim as constituting my invention, and desire to secure by letters patent, is the preparing of the puddler's balls as they are delivered from the puddling furnace, or of other similar masses of iron, by causing them to pass between a revolving cylinder, and a curved segmental trough adapted thereto, and constructed and operating substantially in the manner of that herein described and represented in Figs. 2 and 3, of the accompanying drawings; or by causing the said balls to pass between vibrating or reciprocating tables, surfaces, or plates of iron, in the manner exemplified in Fig. 1, in the accompanying drawing, or between vibrating or reciprocating curved surfaces operating upon the same principle, and producing like result by analogous means.

The fact that two entirely different styles of apparatus were described, and others suggested, for carrying out the process indicates that there was a proper process involved, but expressions used in the case seem to indicate that the novelty was thought to be in the machine. In the preamble we find:

"Be it known that I, etc., have invented an improvement in the process of manufacturing iron, which improvement consists in the employment of a new and useful machine for the rolling of puddler's balls, or balls prepared in the puddling furnace, and of other similar masses of iron."

and in the oath—

"that he does verily believe that he is the original and first inventor or discoverer of the said machine."

The claim, however, is indefinite as to whether process or machine is claimed, but seems to incline to a process rather than to a machine in the statement that what he claimed as constituting his invention and desired to be secured by letters patent, was the preparing of the puddler's balls as they are delivered from the puddling

furnace, or of other similar masses of iron, by causing them to pass between wedging surfaces operating as described to produce the desired result. The court was in doubt whether the claim was for a process or machine and their discussion of the question was in such terms as to raise doubts as to patentability of mechanical processes.

The court decided that the patent should be held to be for the machine and not for a process. This conclusion seems to have been reached as a result of three reasons or circumstances; first, because Burden in his specification refers several times to his invention as being for a new and useful machine; likewise, in the oath, that he believed himself to be the inventor of the machine; and second, to what seems to have been an opinion that purely mechanical processes were not subjects of patents, that only those involving chemical or other elemental forces were; and, third, that processes were usually discovered rather than deliberately devised.

That part of the decision relating to the second and third reasons reads as follows:

"Is the plaintiff's patent for a process or a machine?

"A process, *eo nomine*, is not made the subject of a patent in our act of Congress. It is included under the general term 'useful art.' An art may require one or more processes or machines in order to produce a certain result or manufacture. The term machine includes every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result. But where the result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes, methods, or operations are called processes."

"A new process is usually the result of discovery; a machine of invention."

"The arts of tanning, dyeing, making waterproof cloth, vulcanizing India rubber, smelting ores, and numerous others are usually carried

on by processes, as distinguished from machines. One may discover a new and useful improvement in the process of tanning, dyeing, etc., irrespective of any particular form of machinery or mechanical device, and another may invent a labor saving machine by which this operation or process may be performed, and each may be entitled to his patent. As, for instance, A has discovered that by exposing India rubber to a certain degree of heat, in mixture, or connection with certain metallic salts, he can produce a valuable product or manufacture. He is entitled to a patent for his discovery, as a process or improvement in the art, irrespective of any machine or mechanical device. B, on the contrary, may invent a new furnace, or stove, or steam apparatus by which this process may be carried on with much saving of labor and expense of fuel, and he will be entitled to a patent for his machine, as an improvement in the art. Yet A could not have a patent for a machine or B for a process, but each would have a patent for the means or method of producing a certain result or effect, and not for the result or effect produced. It is for the discovery or invention of some practicable method or means of producing a beneficial result or effect that a patent is granted, and not for the result or effect itself. It is when the term process is used to represent the means or method of producing a result, that it is patentable, and it will include all methods or means which are not effected by mechanism or mechanical combinations."

"But the term process is often used in a more vague sense, in which it can not be the subject of a patent. Thus, we say that a board is undergoing the process of being planed, grain of being ground, iron of being hammered or rolled. Here the term is used subjectively or passively as applied to the material operated on, and not to the method or mode of producing that operation, which is by mechanical means, or the use of a machine as distinguished from a process."

"In this use of the term, it represents the function of a machine, or the effect produced by it on the material subjected to the action of the machine. But it is well settled that a man can not have a patent for the function or abstract effect of a machine, but only for the machine which produces it."

"It is by not distinguishing between the primary and secondary sense of the term 'process' that the learned judge below appears to have fallen into an error. It is clear that Burden does not pretend to have discovered any new process by which cast iron is converted into malleable iron; but a new machine or combination of mechanical devices, by which the slag or impurities of the cast iron may be expelled or pressed out of the metal when reduced to the shape of puddler's balls. The machines used before to effect this compression were tilt hammers and alligator jaws, acting by percussion and pressure, and nobbling rolls with eccentric grooves, which compress the metal by use of the inclined plane, in the shape of a cyclovolute or snail-cam."

"In subjecting the metal to this operation, by the action of these machines, more time and manual labor is required than when the same function is performed by the machine of Burden. He saved labor, and thus produced the result in a cheaper, if not a better, manner, and was therefore the proper subject of a patent."

"In either case, the iron may be said, in the secondary sense of the term, to undergo a process in order to change its qualities, by pressing out its impurities; but the agent which effects the pressure is a machine or combination of mechanical devices."

This decision is interesting as showing the different views that have been taken of this subject of invention, although it is apparently overruled by the decision in *Expanded Metal Co. vs. Bradford*, 214 U. S., 366, since it is there held that purely mechanical processes may be

patentable; and it is not apparent but that an inventor might set to work to devise a process rather than to discover one. It would seem that such intentional development would usually be the case where the process involved the utilization in turn of several chemical or physical facts, as the chances of mere accidental performance of the process would be small. Where the process consisted of a single step it might happen that such discovery would take place.

Following this case, *Corning vs. Burden*, we find the case of *Risdon vs. Medart*, 158 U. S., 68, and 1895 C. D., 330, inclining even more to the position that a mechanical process could not be the subject of a patent. This case involved three patents; one for a process of manufacturing belt pulleys, and two for the pulley. The process patent is the only one which is of interest in this relation. It is Patent No. 248,599, of October 25, 1881, to Philip Medart.

This is a patent for a specific process of building up a belt pulley of separate parts instead of casting an integral wheel. It consists of axially boring a portion which constitutes the hub and spokes, that is, an integral spider. Then truing up the outer ends of the spokes in respect to the bore of the hub; then mounting a rim on the spokes and truing up the rim. Apparatus suitable for use in the process is shown and described in the patent. Claim 3 represents the complete process and reads as follows:

"The herein described improvement in the art of manufacturing belt pulleys, which consists in centering the pulley center or spider, boring the hub thereof, grinding the center or spider concentric with the axis of the pulley, securing the rim concentric with the axis of the pulley, and then grinding or squaring the edges of the rim, substantially as set forth."

After reviewing several of its prior decisions, the court cited with approval *Corning vs. Burden*, 15 How., 252, and apparently concluded that because Medart's process was not a chemical process and did not consist in the use of one of the agencies of nature, it could consequently be

only the function of a machine and not patentable. Whether this process necessarily depends upon a particular machine and could not be performed by other machines or by hand does not seem to have been considered. No reason is apparent why it could not be so performed, that is, without a specific machine, or why it is not a proper process according to present practice. It may be noted here that the practice of the Patent Office granting these mechanical processes undoubtedly finally settled the law.

Another case often cited in connection with the question of mechanical processes and function of machines is that of *Boyden Power Brake Co. et al. vs. Westinghouse et al.*, and *Westinghouse et al. vs. Boyden Power Brake Co. et al.*, 170 U. S., 537 and 1898 C. D., 443.

This case involved the question of infringement of claims 1, 2, and 4 of the patent to Westinghouse, 360,070, for a "Fluid Pressure Automatic-Brake Mechanism." The question related to a rather specific feature of the air brake in general and for that reason a careful construction of the claims was necessary. The court took into consideration that the patent was not of the pioneer type. The claims were drawn to apparatus of which claim 2 will serve as illustration.

"Claim 2. In a brake mechanism, the combination of a main air pipe, an auxiliary reservoir, a brake-cylinder, and a triple valve having a piston whose preliminary traverse admits air from the auxiliary reservoir to the brake-cylinder, and which by a further traverse admits air directly from the main air pipe to the brake cylinder, substantially as described."

It was urged that this claim be construed to be for a process so as to broaden its scope sufficiently to cover the alleged infringing device, but the court held that, if considered to be for a process, there might be doubt of its validity, since it still seemed to be an open question whether processes which did not involve chemical or other similar elemental action were valid, citing *Corning vs. Burden*, 103 U. S., 461, and *Risdon vs. Medart*, 158 U. S., 680, as indication of the negative contention, and *Eastern*

Paper Bag Co. *vs.* Standard Paper Bag Co., 30 F. R., 63; Union Paper Bag Machine Co. *vs.* Waterbury, 39 F. R., 389; and Travers *vs.* American Cordage Co., 64 F. R., 771, as indication of the affirmative; and further that if it should be attempted to construe the claim in the direction of a process, it would apparently not be such, but merely the function of the apparatus or machine which would be an unpatentable subject. However, the court held that they would not assume or decide either of the above questions since the claim was clearly drawn to a mechanism and could not in any way be construed to be for a process.

This case, therefore, still left the patentability of mechanical processes in doubt so far as the Supreme Court is concerned. Eleven years later, however, we find a decision by this court, which clearly and definitely states that such processes are proper subjects of patents. That case is the case of *The Expanded Metal Co. et al. vs. Bradford et al.*, and *The General Fireproofing Co. vs. The Expanded Metal Co.*, 214 U. S., 366, and 143 O. G., 863, 1909, C. D., page 521, which involved a patent to John F. Golding, 527,242, for a process of forming expanded sheet metal suitable for use in plastering and cement work. The process claimed is purely mechanical, yet clearly not dependent on any particular machine for performing it. The process is very clearly set forth in a claim of good form as follows:

"The herein described method of making open or reticulated metal work which consists in simultaneously slitting and bending portions of a plate or sheet of metal in such manner as to stretch or elongate the bars connecting the slit portions and body of the sheet or plate, and then similarly slitting and bending in places alternate to the first-mentioned portions, thus producing the finished expanded sheet metal of the same length as that of the original sheet or plate, substantially as described."

Looking at the subject now, there appears to be no logical reason why the propriety of such processes should be questioned; but as has been shown certain decisions

had assumed, although they did not perhaps expressly decide, that they were not patentable.

The court disposed of the question in this case by the statement that—

“an invention or discovery of a process or method involving mechanical operations and producing a new and useful result may be within the protection of the Federal Statute and entitle the inventor to a patent for his discovery.”

This statement by the Supreme Court would seem to settle the question. It may be noted that quite a number of lower court decisions had clearly announced this conclusion of which *In re Weston*, C. D., 1907, 290, by the Court of Appeals of the District of Columbia, and those cited above in the case of *Westinghouse vs. Boyden* are good examples.

Still a different type of alleged process is that involving motors or other apparatus operated by electricity, steam, hydraulic pressure, etc. We have a few decisions along this line which are instructive. One is—*In re Creverling*, C. D., 1905, 684, appealed to Court of Appeals of the District of Columbia from the Patent Office, relating to an alleged process of regulating an electric generator or dynamo. The application included description and drawings of the particular apparatus and no description of any process, the mere operation of the device being the alleged process.

Briefly, the invention consisted in varying the field or other circuit of the machine by means of an electric motor device in which an independently determined magnetomotive force is opposed by a magnetomotive force which is a function of the current generated. There is thus produced a resultant magnetic field whose polarity is dependent upon the current generated. Exposed to the action of the resultant magnetic field is a member (a motor armature) which tends to set up an independent magnetic field, producing motion in a positive or negative direction and thereby causing the generator to be regulated in the manner desired. This final regulation was done actually by the movement of a rheostat included in circuit with the field of the

generator and mechanically connected with the motor armature. An example of the claims is—

“The herein described method of regulating the output of a generator which consists in producing mechanical motion by the combined action of a flux which is the resultant effect of a magnetic motive force which is a function of the current generated, and a determined magnetomotive force and another flux substantially as specified.”

The court said that since applicant already had a patent on a machine operating on this principle, the alleged process was so associated with the machine that it would be unpatentable thereover. Incidentally, the court also said that the claims, if considered to be proper process claims, were incomplete for the purpose alleged because they omitted one of the essential steps of the process, that of the operation of the rheostat, and that they would be unallowable on that account.

A very recent case, however, seems to be in conflict with the above conclusion as to what constitutes a true process aside from the function of the machine and patentable thereover. This case is *Century Electric Co. vs. Westinghouse Electric and Manufacturing Co.*, 191 Fed. Rep., 350, 207 O. G., 1249. It relates to patentability of a process over apparatus, where the two seem to be very closely associated. The two subjects were allowed to the same patentee in different patents. They were patents 511,915 and 555,190 to Nicola Tesla for an electric motor and process.

Claim 1 of patent 511,915 for the process reads as follows:

“The method of operating electro-magnetic motors having independent energizing circuits as herein described, which consists in passing an alternating current through one of the energizing circuits and inducing by such current the current in the other energizing circuit of the motor as set forth.”

The machine as set forth in claim 1 of patent 555,190 reads as follows:

"In an electro-magnetic motor, the combination of independent energizing circuits, one adapted to be connected with a source of alternating current, the other arranged in inductive relation to the said first circuit whereby the motor will be operated by the resultant action of the two circuits as set forth."

The court in this case held the above process claim to be a proper one. It seems to me that *In re Creverling* is the more logical of the above two cases, and that the process claim in the second case is entirely useless.

In some cases where an inventor has devised a machine or apparatus, it may be that there is also a proper process involved in connection with it which the device is capable of carrying out. But to entitle him to claim the process, it must be such as not to be dependent exclusively on that particular apparatus and the burden is upon applicant to point out as example another apparatus capable of carrying out the process unless the suggestion of such other apparatus is within the reach of persons skilled in that art. In these cases, unless the Examiner can readily see that other apparatus might be used, such examples should be required, or more directly the claim should be held to be merely the function of the apparatus.

American Lava Co. vs. Stewart, 155 F. R., 731, 1909, C. D., 557.

In re Cunningham, 1903, C. D., 524, Court of Appeals of the District of Columbia, related to an alleged process of coaling ships at sea. It consisted of making a flexible connection between two ships to serve as a conveyor from one ship to the other, then creating tension on the cable to hold it in proper stretched condition. This tension was created by propelling one ship from the other. There had already been allowed a claim on the apparatus and the process claim rejected read as follows:

"The improvement in the art of coaling ships in the open water herein described, the same

consisting in making a flexible connection athwartships, or abeam, between the ship to be supplied and the ship from which the coal is to be taken at sufficient distance apart to permit rolling and pitching of both ships without interference with each other, and creating sufficient lateral pressure between one of the ships and the surrounding water on the side toward the other ship to maintain them at such distance apart."

The court was very positive that there was no patentable process set forth; that the alleged process could not be conceived of independently of the particular apparatus of which it was merely the function or use.

MISCELLANEOUS FEATURES.

Where a process is an obvious and apparently the only patentable way of producing an article, the invention is said to reside in the article and not in the process. The Examiner may suggest this idea to applicant where the invention seems to be claimed in the wrong form. *Ex parte* Trevette, 1901, C. D., 170, and Mica Insulator Co. *vs* Commercial Mica Co., 157 F. R., 90.

A situation similar to this is that if a patent is taken out for an article defined by a process of producing it, that patent is a bar to the allowance of any subsequent separate patent claiming that process.

Mosler vs. Mosler, 127 U. S., 354, 43 O. G., 1115, 1888, C. D., 420, and *Oval Wood Dish Co. vs. Sandy Creek Mfg. Co.*, 1894, C. D., 216.

Another point of importance in treating process claims is the rule that in applying references it is not sufficient that a prior apparatus might have been used to carry out the process, but it must appear that it was actually intended to perform the process, or that such use would have been obvious to a person skilled in the art in which it was used. The mere existence of a piece of apparatus does not necessarily suggest all the possible uses of it, and any process which would be outside the range of those which would obviously suggest themselves

upon use of the apparatus would be patentable over it. This is merely the converse of the rule that the use of an old device in an entirely new and non-analogous art may amount to invention.

The former of these rules was announced in the Supreme Court decision—*The Carnegie Steel Co. vs. The Cambria Iron Co.*, 1902, C. D., 592. The patent involved was that to Jones, 404,414, June 4, 1889. It involved the question of anticipation of the process for producing Bessemer steel directly from blast furnace iron without intermediate cooling, involving as the important step the feature of maintaining a large bath of molten metal replenished by successive portions of molten metal direct from one or more blast furnaces and discharged from the bath in small quantities into the converter to be blown. The important thing was the fact that there was maintained at all times in the mixing bath a mass of metal, many times greater than the successive additions and discharges.

The claim involved was:

"In the art of mixing molten metal to secure uniformity of the same in its constituent parts preparatory to further treatment, the process of introducing into a mixing-receptacle successive portions of molten metal ununiform in their non-metallic constituents (sulfur, silicon, etc.), removing portions only of the composite molten contents of the receptacle without entirely draining or emptying the same, and successively replenishing the receptacle with fresh ununiform additions, substantially as and for the purpose described."

Several prior devices cited might have been operated so as to follow the process, but the court did not find sufficient proof to show that they had been so operated or that their use would have suggested the Jones process; hence the above rule.

This rule was followed also in *Loew vs. German-American*, 164 Fed. Rep., 855.

AGGREGATION.

In general, the same rules apply to processes as to apparatus in determining whether an alleged process is in fact a single process, that is, a proper combination of steps, or whether it is made up of parts which are independent of each other and consequently an aggregation, and also, if the association of steps forms a proper combination, to determine whether the novelty is in the combination, as a whole or merely in one part of it. If merely in a part, then the claims should be limited to the part that is new.

As in machines and apparatus, the elements making up the process, that is, the steps and any groups of steps which form sub-processes, must cooperate with each other to produce a new result which is different from the mere sum of the results of the steps if performed separately. There must be some degree of direct dependence upon each other.

A very difficult question peculiar to processes arises where several processes which are old and which belong to arts that are distinct are associated with the object of using up by-products. A favorite expression for this style of associated processes is "cyclical processes." They are often very important commercially and the continuance of some chemical industries depends upon such special association. A large number of these alleged processes will be found to sift down to a purely commercial proposition. The several distinct processes involved not mutually affecting the operation each of the other; each would operate in the same way whether associated or not. This condition of affairs seems plainly not to fulfill the established rules as to patentable combinations and constitutes only an aggregation, and this would seem to follow whether the individual processes were new with applicant or old. If, however, as happens in some cases, they do affect each other so as to produce a new result, then they are, of course, patentable as a new process.

Mond vs. Duell, decided by Court of Appeals, D. C., 1900, C. D., 298, announces the simple rule that asso-

ciation of two old processes does not constitute invention where no new result is produced.

This case involved the following claim:

"The herein described improvement in the manufacture of zinc, which consists in lixiviating roasted zinc ores by a solution of caustic soda or potash, electrolyzing the solution of zinc oxide thus obtained with an anode of sodium or potassium amalgam, and causing deposit of zinc on a metallic cathode, as specified."

Both main parts of this alleged process were old; first, that of making a zinc solution by lixiviating roasted zinc ores with caustic soda or potash, and, second, that of electrolyzing the zinc solution in the same way. No new result would be expected from this mere association and apparently applicant could show none.

The rule that each claim should set forth all the steps necessary to make a process or subprocess, which is sufficiently complete to be operative to accomplish some useful purpose, is as important in processes as the analogous rule in machine cases requiring a complete combination or subcombination. As was said in the case of Oxnard & Baur, C. D., 1899, 170, decision by the Commissioner of Patents:

"An applicant may properly in one case have claims covering the principal or essential steps of his process and other claims including those steps, together with other specific steps which are not absolutely necessary to the performance of the process, but which add to its efficiency or make its operation more perfect. The mere inclusion in one claim of a step not included in another claim does not, therefore, make those claims cover entirely different processes which can not properly be retained in one case."

The invention involved was a process of making sugar, and claim 2 included as an intermediate step in that process "agitating and reducing the temperature of this second masse-cuit," whereas claim 1 omitted that step.

The court held that this step was not so vital to the process that its inclusion or omission would materially affect the principle or operation thereof.

A similar rule was announced in the case of *In re Creverling*, C. D., 1905, 684.

The above remark does not refer to claims related as process and sub-process, but to an integral process not susceptible of division into any distinct sub-processes. It is well established that process and sub-process may stand together where the sub-process is complete for some useful purpose, and where it does not belong to a specific and recognized art of its own.

As to alternate species of process either as complete or sub-processes, there is no reason why the same rules do not apply as in machine cases in accordance with *Ex parte Eagle*, 1870, C. D., 137.

Another situation which often arises in process cases is where, after a series of steps, two or more products may result and two or more processes may be necessary to continue the treatment of these two products. It might be said that the process splits or branches out into a plurality of different lines; these different lines considered separately might or might not form recognized independent subjects of invention; if they do, of course they should be divided; if not, they may stand together.

A system of transacting business is not a subject of a patentable process, though made up of a series of transactions to be performed in sequence.

Hotel vs. Lorain, 160 Fed., 467.

Fowler vs. City of New York, 121 Fed., 747.

The law requires that an applicant state the necessary steps, whether or not he is able to state the scientific principles upon which the process depends. But it is always desirable, if possible, to discover and state the principle involved, provided it can be correctly determined, because if an alleged invention be made and the case be prepared on purely empirical methods of research the applicant may omit to describe an essential point or step which makes the process operative but which in the course of arbitrary performance of the process had been done unintentionally or merely incidentally to some other

step which was thought important, but which was not. This would not happen if the theory of the process were thoroughly understood; and in that case also claims can be framed in the most direct and broadest terms to protect the important points of the process. This relates to chemical processes principally, since the principles underlying purely mechanical processes are usually obvious from mere description of the process. Wherever principles are set forth as the foundation of a process, the examiner should carefully verify them by comparison with published statements of reliable authorities, if available, and if not available, or if they vary therefrom, then by affidavits stating facts found to be true by tests performed by reliable experts in that line.

The weight put upon the theory or principles on which a process depends is illustrated by the case of *Steward et al. vs. American Lava Co. et al.*, C. D., 1909, 557, in which the United States Supreme Court concluded in regard to the patent to Dolan, 589,342, Aug. 31, 1897, Acetylene-Gas Burner, that—where an application as originally filed did not differentiate from the prior art either in construction or theory of operation and an amendment thereto was filed, without verification by the inventor, introducing a new theory of operation and containing process claims covering such theory, such claims are invalid as covering new matter.

The particular amount of detail in the directions for carrying out the steps depends upon the nature of the process; if it is obvious from a mere mention of the general steps necessary to the process how they might be carried out, this is sufficient; if not obvious to one skilled in the art, then the inventor must give specific directions both as to details of steps and apparatus suitable for one way of performing the process. A very convenient kind of drawing to illustrate a chemical process is a diagrammatic one; that is, one in which the minute details of the apparatus are not shown, but in which mere outlines of the elements are used and legends are applied to the different elements to show the reactions or steps taking place in that part.

A patent for a process including steps for the per-

formance of which there is **no** known means, would be void even where the means could probably be devised, but where devising the means would necessitate invention.

Dountown *vs.* Yeager Milling Co., 17 O. G., 906.

Where a patent clearly shows and describes a machine use of which necessarily involves the performance of the process, it constitutes a bar to the grant of a patent on that process.

New Process Fermentation Co. *vs.* Koch, 28 O. G., 535.

January 21, 1915.



